WF-M638G-UWP1

IEEE 802.11 /b/g/n, Wireless Module&Bluetooth Module

Integrated Bluetooth 2.1+EDR/4.2/5.0

Features：

- **Reserving System**
  IEEE Std. 802.11b
  IEEE Std. 802.11g
  IEEE Std. 802.11n
  Bluetooth 2.1+EDR/4.2/5.0
- **Chip Solution**
  Mediatek MT7638GUN
- **Size**
  33.0mm x70.0mm x 6.0mm

Model Overview：

Model	Standard	Rate	Band	Power
WF-M638G-UWP1	IEEE 802.11b/g/n	300Mbps	2.4G	5V
	Bluetooth2.1+EDR/4.2/5.0	3Mbps	2.4G	

Sichuan AI-Link Technology Co.,Ltd.

Add：**Anzhou,Industrial park,Mianyang,Sichuan**

Phone：**+86-13881190925**

Web ：**http://www.changhong.com**

1. Introduction

WF-M638G-UWP1 module design is based on Mediatek MT7638GUN solution, The MT7638GUN is a highly integrated single chip which has built in a 2x2 dual-band wireless LAN radio and Bluetooth radio. It includes Bluetooth EDR and LE radio which complies with Bluetooth v2.1+EDR, v4.2, and v5.0.
The Module is a highly integrated MAC/BBP and 2.4GHz PA/LNA single chip which supports a 300Mbps PHY rate. The Module is designed to support standard-based features in the areas of security, quality of service, and international regulations, giving end users the greatest performance anytime and in any circumstance. This documentation describes the engineering requirements specification.

1.1 RF module Overview

The general HW architecture for the module is shown in Figure 1. This WLAN Module design is based on Mediatek MT7638GUN. It is a highly integrated single-chip MIMO(Multiple In Multiple Out) Wireless LAN (WLAN) network interface controller complying with the 802.11 specification and Bluetooth over USB interface. It combines a MAC, a 2T2R capable baseband, and RF in a single chip. An intelligent Wi-Fi/Bluetooth coexistence algorithm is implemented to provide the best harmonized Wi-Fi and Bluetooth radio performance.

1.2 Specification reference

This specification is based on additional references listed below.

_ IEEE Std. 802.11b
_ IEEE Std. 802.11g
_ IEEE Std. 802.11n
_ Bluetooth 2.1+EDR/4.2/5.0

1.3 System Functions

Table1: General Specification as below:

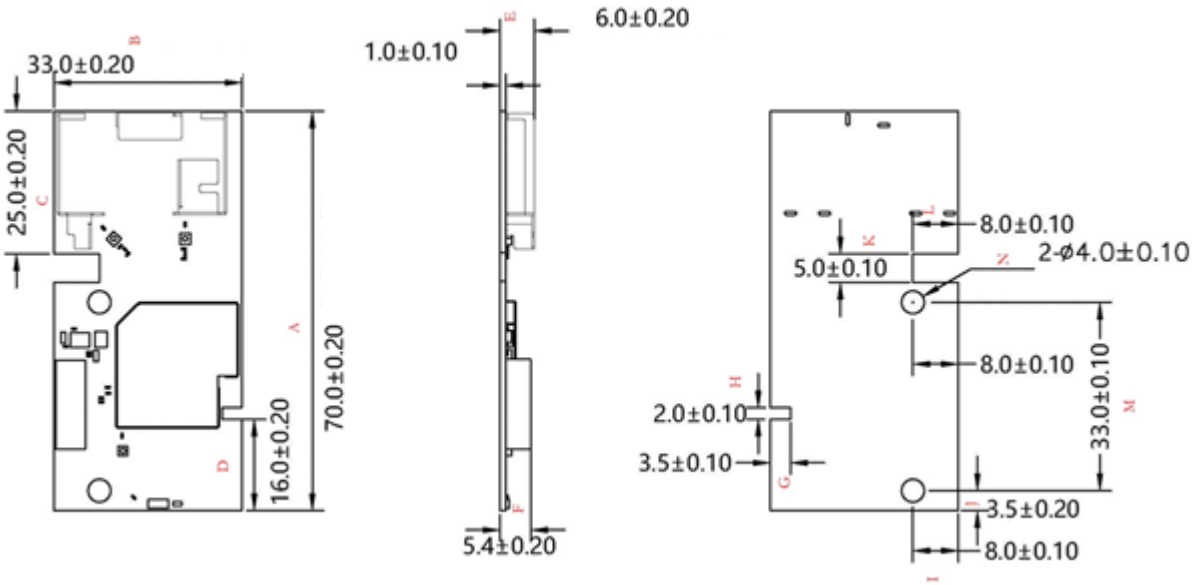
Main Chipset	Mediatek MT7638GUN
Operating Frequency	2.4G
WiFi Standard	802.11b/g/n (2x2)
Bluetooth	2.1+EDR/4.2/5.0
Modulation	WIFI:11b: DBPSK, DQPSK and CCK and DSSS 11g: BPSK, QPSK, 16QAM, 64QAM and OFDM 11n: BPSK, QPSK, 16QAM, 64QAM and OFDM BT: GFSK, π/4-DQPSK ,8-DPSK
Data rates	11b: 1, 2, 5.5 and 11Mbps 11g: 6, 9, 12, 18, 24, 36, 48 and 54 Mbps 11n: MCS0~15, up to 300Mbps
Form factor	10pins ,
Host Interface	USB 2.0
PCB Stack	4-layers design
Dimension	Typical，33.0mm x70.0mm x 6.0mm
Antenna	Internal Antennas Design
Operation Temperature	-10℃ to +70℃
Storage Temperature	-40℃ to +125℃
Operation Voltage	5V +/-10%

2. Mechanical Specification

2.1 Mechanical Outline Drawing

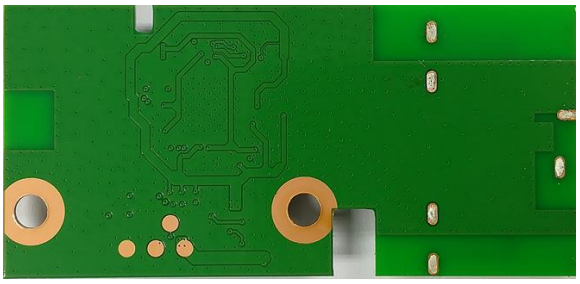
Typical Dimension (W x L): 33.0mm x70.0mm x 6.0mm

General tolerance: ±0.15mm



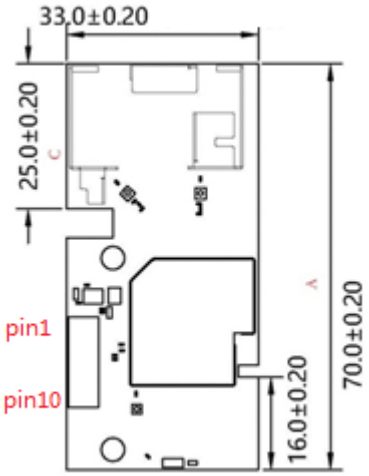
2.2 Product Picture

TOP VIEW



BOTTOM VIEW

2.3 Pin Define



NO	Define	Note
1	DC_EN	Control the DC/DC to reset the Module
2	NC	Not Connect
3	VCC	Power supply
4	BTDN	USB D-
5	BTDP	USB D+
6、7	GND	Ground
8	3D_SYNC	3D signal synchronization
9	REG_ON	Reset
10	WLAN_DEV_WAKE	WIFI wake Host

3. Electrical Specification

This Specification is based-on conductive DVT testing result. The extreme condition include overall temperature (0℃,+25℃,+40℃) and overall voltage (3.0V,3.3V,3.6V).

3. 1 IEEE 802.11g Section:

Items	Contents				
Specification	IEEE802.11g				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH1 to CH13 @ 11g				
Data rate	6, 9, 12, 18, 24, 36, 48, 54Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) 15dBm Target (For Each antenna port) @ 11g/6Mbps~54Mbps	13	15	17	dBm	
2. Spectrum Mask @ Target Power					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-40	dBr	
3. Constellation Error(EVM) @ Target Power					
1) 6Mbps	-	-	-5	dB	
2) 9Mbps	-	-	-8	dB	
3) 12Mbps	-	-	-10	dB	
4) 18Mbps	-	-	-13	dB	
5) 24Mbps	-	-	-16	dB	
6) 36Mbps	-	-	-19	dB	
7) 48Mbps	-	-	-22	dB	
8) 54Mbps	-	-	-25	dB	
4. Frequency Error					
1) IEEE802.11g	-15	-	15	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) 6Mbps (PER ≦10%)	-	-	-82	dBm	
2) 9Mbps (PER ≦10%)	-	-	-81	dBm	
3) 12Mbps (PER ≦10%)	-	-	-79	dBm	

4) 18Mbps (PER ≦10%)	-	-	-77	dBm	
5) 24Mbps (PER ≦10%)	-	-	-74	dBm	
6) 36Mbps (PER ≦10%)	-	-	-70	dBm	
7) 48Mbps (PER ≦10%)	-	-	-66	dBm	
8) 54Mbps (PER ≦10%)	-	-	-65	dBm	
6. Maximum Input Level (PER ≦10%)					
1) IEEE802.11g	-20	-	-	dBm	

3.2 IEEE 802.11b Section:

Items	Contents				
Specification	IEEE802.11b				
Mode	DBPSK, DQPSK and CCK and DSSS				
Channel	CH1 to CH13				
Data rate	1, 2, 5.5, 11Mbps				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels(Calibrated)					
1) 17dBm Target (For Each antenna port) @1Mbps~11Mbps	15	17	19	dBm	
2. Spectrum Mask @ Target Power					
1) fc +/-11MHz to +/-22MHz	-	-	-30	dBr	
2) fc > +/-22MHz	-	-	-50	dBr	
3. Constellation Error(EVM) @ Target Power					
1) 1Mbps	-	-	-10	dB	
2) 2Mbps	-	-	-10	dB	
3) 5.5Mbps	-	-	-10	dB	
4) 11Mbps	-	-20	-10	dB	
4. Frequency Error	-15	-	15	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) 1Mbps (FER ≦8%)	-	-83	-76	dBm	
2) 2Mbps (FER ≦8%)	-	-80	-76	dBm	
3) 5.5Mbps (FER ≦8%)	-	-79	-76	dBm	
4) 11Mbps (FER ≦8%)	-	-76	-76	dBm	
6. Maximum Input Level (FER ≦8%)	-10	-	-	dBm	

3.3 IEEE 802.11n HT20 Section:

Items	Contents				
Specification	IEEE802.11n HT20 @ 2.4G				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH1 to CH13 @ 2.4G				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels					
1) 14dBm Target (For Each antenna port) @ 2.4G/MCS0~MCS7	13	15	17	dBm	
2. Spectrum Mask @ Target Power					
1) at fc +/-11MHz	-	-	-20	dBr	
2) at fc +/-20MHz	-	-	-28	dBr	
3) at fc > +/-30MHz	-	-	-45	dBr	
3. Constellation Error(EVM) @ Target Power					
1) MCS0	-	-	-5	dB	
2) MCS1	-	-	-10	dB	
3) MCS2	-	-	-13	dB	
4) MCS3	-	-	-16	dB	
5) MCS4	-	-	-19	dB	
6) MCS5	-	-	-22	dB	
7) MCS6	-	-	-25	dB	
8) MCS7	-	-	-28	dB	
4. Frequency Error					
1) IEEE802.11n HT20 @ 2.4G	-15	-	15	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) MCS0 (PER ≦10%)	-	-	-82	dBm	
2) MCS1 (PER ≦10%)	-	-	-79	dBm	
3) MCS2 (PER ≦10%)	-	-	-77	dBm	
4) MCS3 (PER ≦10%)	-	-	-74	dBm	
5) MCS4 (PER ≦10%)	-	-	-70	dBm	
6) MCS5 (PER ≦10%)	-	-	-66	dBm	
7) MCS6 (PER ≦10%)	-	-	-65	dBm	
8) MCS7 (PER ≦10%)	-	-	-64	dBm	
6. Maximum Input Level (PER ≦10%)					
1) IEEE802.11n HT20 @ 2.4G	-20	-	-	dBm	

3.4 IEEE 802.11n HT40 Section:

Items	Contents				
Specification	IEEE802.11n HT40 @ 2.4G				
Mode	BPSK, QPSK, 16QAM, 64QAM and OFDM				
Channel	CH3 to CH11 @ 2.4G				
Data rate (MCS index)	MCS0/1/2/3/4/5/6/7/8/9/10/11/12/13/14/15				
TX Characteristics	Min.	Typ.	Max.	Unit	Remark
1. Power Levels (Calibrated)					
1) 14dBm Target (For Each antenna port) @ 2.4G/MCS0~MCS7	13	15	17	dBm	
2. Spectrum Mask @ Target Power					
1) at fc +/-21MHz	-	-	-20	dBr	
2) at fc +/-40MHz	-	-	-28	dBr	
3) at fc > +/-60MHz	-	-	-45	dBr	
3. Constellation Error(EVM) @ Target Power					
1) MCS0	-	-	-5	dB	
2) MCS1	-	-	-10	dB	
3) MCS2	-	-	-13	dB	
4) MCS3	-	-	-16	dB	
5) MCS4	-	-	-19	dB	
6) MCS5	-	-	-22	dB	
7) MCS6	-	-	-25	dB	
8) MCS7	-	-	-28	dB	
4. Frequency Error					
1) IEEE802.11n HT20 @ 2.4G	-15	-	15	ppm	
RX Characteristics	Min.	Typ.	Max.	Unit	
5. Minimum Input Level Sensitivity(each chain)					
1) MCS0 (PER ≦10%)	-	-	-79	dBm	
2) MCS1 (PER ≦10%)	-	-	-76	dBm	
3) MCS2 (PER ≦10%)	-	-	-74	dBm	
4) MCS3 (PER ≦10%)	-	-	-71	dBm	
5) MCS4 (PER ≦10%)	-	-	-67	dBm	
6) MCS5 (PER ≦10%)	-	-	-63	dBm	
7) MCS6 (PER ≦10%)	-	-	-62	dBm	
8) MCS7 (PER ≦10%)	-	-	-61	dBm	
6. Maximum Input Level(PER ≦10%)					
1) IEEE802.11n HT20 @ 2.4G	-20	-	-	dBm	

3.6 Bluetooth Section:

Items	Contents				
Specification	BT2.1+EDR/4.2/5.0				
Mode	GFSK, π/4-DQPSK and 8-DPSK				
Number of Channel	0,39,78 Channel				
Frequency Band	2.400 ~ 2.4835 GHz				
	Min.	Typ.	Max.	Unit	Remark
1. Output Power		6	-	dBm	
2.Gain step	2	4	8	dB	
3. Receiver sensitivity (BER ≦0.1%)	-	-93.5	-80	dBm	
4. Maximum usable signal (BER ≦0.1%)	-	-5	-		
5. C/I co-channel (BER<0.1%)	-	4	11	dB	
6. C/I 1MHz (BER<0.1%)	-	-14	0	dB	
7. C/I 2MHz (BER<0.1%)	-	-42	-30	dB	
8. C/I≥3MHz (BER<0.1%)	-	-49	-40	dB	
9. C/I Image channel (BER<0.1%)	-	-25	-9	dB	
10. C/I Image 1MHz (BER<0.1%)	-	-50	-20	dB	
11. Inter-modulation	-	-13	-	dB	
12. Out-of-band blocking					
1). 30MHz to 2000MHz	-10	-	-	dBm	
2). 2000MHz to 2399MHz	-27	-	-	dBm	
3). 2498MHz to 3000MHz	-27	-	-	dBm	
4). 3000MHz to 12.75GHz	-10	-	-	dBm	
13. Modulation characteristics					
1). Δf1avg	140	157	175	KHz	
2). Δf2max (For at least 99.9% of all Δf2max)	115	140	-	KHz	
3). Δf1avg /Δf2avg	0.8	0.98	-	KHz	
14. ICFT	-75	±20	+75	KHz	
15. Carrier frequency drift					
1). One slot packet (DH1)	-25	±15	+25	KHz	
2). Two slot packet (DH3)	-40	±15	+40	KHz	
3). Five slot packet (DH5)	-40	±15	+40	KHz	
4). Max drift rate	-	6	20	KHz/50us	
16. TX output spectrum(20dB bandwidth)	-	922	1000	KHz	
17. In-Band spurious emission					
1). ±2MHz offset	-	-45	-20	dBm	
2). ±3MHz offset	-	-48	-40	dBm	
3). >±3MHz offset	-	-48	-40	dBm	

4. Current consumption

4.1 WLAN current consumption

Description	Average current（mA）
Sleep mode，radio off	1.5
2.4GHz RX power saving，DTIM=1	3.3
2.4GHz RX active，HT20，MCS15	144
2.4GHz TX CCK，11Mbps@21dBm	403
2.4GHz TX HT20，MCS15 @17.5dBm	496
2.4GHz TX HT20，MCS8 @18dBm	520

4.2 Bluetooth current consumption

Description	Average current（mA）
Sleep mode，radio off	1.5
Bluetooth TX@9dBm	42
Bluetooth RX	21
Bluetooth SCO connection，HV3 packets + sniff mode + scan（page scan interval=1.28sec，inquiry scan interval=2.56s，sniff interval=500ms）	21
Bluetooth page scan + inquiry scan（（page scan interval=1.28sec，inquiry scan interval=2.56s）	1.7
Bluetooth page scan（page scan interval=1.28sec）	1.6

Note：

1、 **All result is measured provided VDD33 is 3.3V. Tx power is measured at antenna port. Temperature is 25℃.**

2、 **Host interface is USB2.0**

3、 **Duty cycle for TX/RX measurement is 100%**

4、 **The chip variation is +/-15%**

5、 **Software Requirements**

The driver supports the following operating systems: Linux, Microsoft Windows XP, Vista and Win7.
Mfg. software tool is MT76x8BUN_QA_Tool.

IC Statement

This device complies with Industry Canada's licence-exempt RSSs. Operation is subject to the following two conditions:

(1) This device may not cause interference; and

(2) This device must accept any interference, including interference that may cause undesired operation of the device.

The term "IC: " before the certification/registration number only signifies that the Industry Canada technical specifications were met. This product meets the applicable Industry Canada technical specifications.

Le présent appareil est conforme aux CNR d'Industrie Canada applicable aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage,

et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement

CE tatement

Herby, Sichuan AI-Link Technology Co., Ltd. declares that this Wireless Module&Bluetooth Module，WF-M638G-UWP1 is in compliance with the essential requirements and other relevant provisions of Directive 2014/53/EU.In accordance with Article 10(2) and Article 10(10), this product allowed to be used in all EU member states.

Operation Temperature：Use the WF-M638-UWP1 in the environment with the temperature between 0℃ and 60℃

Operation Frequency range: Wifi: 2412MHz-2472MHz BT/BLE: 2402MHz-2480MHz

Max RF Output Power: For 2.4G WIFI: 0.0286W
For BT: 0.0059W
For BLE: 0.0049W

The above frequency can be used of Europe without restriction.

Manufacturer：Sichuan AI-Link Technology Co., Ltd.
Address：Anzhou,Industrial park,Mianyang,Sichuan, China
Tel: +86- 0816-2438701
Fax: +86- 0816-2438701
E-mail: caixia.hu@changhong.com

FCC Statement

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
-- Reorient or relocate the receiving antenna.
-- Increase the separation between the equipment and receiver.
-- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
-- Consult the dealer or an experienced radio/TV technician for help
This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1)this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.
FCC Radiation Exposure Statement
The modular can be installed or integrated in mobile or fix devices only. This modular be installed in any portable device, for example, USB dongle like transmitters is forbidden. This modular complies with FCC RF radiation exposure limits set forth for an uncontrolled environment. This transmitter must not be collocated or operating in conjunction with antenna or transmitter. If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display label referring to the enclosed module. This exterior label can use wording such as the following:" Contains Transmitter Module FCC ID: 2AOKI-WFM6638GUWP1 Or Contains FCC ID: 2AOKI-WFM638GUWP1 when the module is installed inside another device, the user manual of this device must contain below warning statements;1. This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions :(1) This device may not cause harmful interference.(2) This device must accept any interference received, including interference that may undesired operation.2. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product. This device is intended only for OEM integrators under the followingconditions:1) The antenna must be installed such that 20 cm is maintained between the antenna and user.2) The transmitter module may not be co-located with any other transmitter or antenna. Module Antenna Type: Ceramic Antenna, ,ANT Gain: BT/BLE: 2dBi, 2.4G Wifi: 2dBi